

# PATENT SPECIFICATION

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- (21) Application No. 46456/75 (22) Filed 11 November 1975  
 (23) Complete Specification Filed 29 October 1976  
 (44) Complete Specification Published 31 May 1979  
 (51) INT. CL.<sup>2</sup> B65H 23/32  
 (52) Index at Acceptance  
 B8R 8M 8T RB2  
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## (54) IMPROVEMENTS IN OR RELATING TO A DIVERTING AND ALIGNING MECHANISM

(71) We, TIMSONS LIMITED, a British Company, of Perfecta Works, Bath Road, Kettering, Northamptonshire, NN16 8NQ, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a diverting and aligning mechanism for a printing machine, more especially a rotary printing machine, and also to a printing machine embodying such a mechanism.

In the printing section of a rotary printing machine, the pages of a book, for example, are printed in alignment across the width of a travelling web of paper, board or the like. The travelling web then passes to a slitting station where a plurality of slitter blades slit the printed web longitudinally into a plurality of cut lengths of equal width and corresponding to the width of a page of the finished book. The direction of the cut lengths is then diverted to a direction out of alignment with that of the travelling web for further processing. Where the latter direction is perpendicular, or substantially so, to the direction of the travelling web, a roller or bar is mounted diagonally across the path of each respective cut length and a cut length caused to pass thereover. Thus, the cut lengths of paper or board are diverted to a path substantially perpendicular to the direction of movement of the travelling web and in superimposed or stacked relationship.

After the paths of the cut lengths have been diverted as described above, it will be appreciated that the printed matter on the length is not in register throughout the stack and before the stack can be cut into a plurality of individual books or booklets, for example, the printed matter must be so registered. The mechanism for achieving this takes the form of a plurality of alignment rollers disposed below the diagonal rollers and around which the individual cut lengths are caused to travel. The mechanism is

fixed to the printing machine and the disposition and spacing of the alignment rollers is such that subsequent to their passage around the rollers, the printed matter in the stack on the separate lengths is in register.

One disadvantage of the above-described diverting mechanism is that when the apparatus is set to cut a travelling web into say four widths and it becomes necessary to change-over to cut the web into three widths, the slitter blades, diagonal rollers and the alignment rollers disposed below the diagonal rollers must all be reset to take into account the new width. Clearly, this is time-consuming and thus expensive and the whole printing machine is placed out of action until resetting has been achieved.

In accordance with the present invention there is provided a removably mounted diverting and aligning mechanism for diverting a plurality of webs travelling in a first direction in side-by-side relationship for movement, in register and in superimposed relationship, in a second direction, said mechanism comprising a frame assembly mounting a plurality of rollers or bars over which respective one of said webs are caused to pass, said rollers or bars having longitudinal axes so aligned at an angle with respect to said frame assembly that webs leaving the rollers or bars do so in the plane of said second direction, and a pair of alignment rollers or bars associated with each said first-mentioned roller or bar, said alignment rollers or bars being carried by said frame assembly, between each pair of alignment rollers or bars being operable to correct misalignment in the webs introduced by said first-mentioned rollers or bars.

The invention will now be described further by way of example with reference to the accompanying drawing, the single figure of which is a partially cut-away perspective view of part of a printing machine embodying a diverting and aligning mechanism in accordance with the present invention.

In the drawing a web of paper 10 is shown as

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being fed in the section of arrow A from a printing section (not shown) of a rotary printing machine (not shown in full). The web 10 is guided towards a diverter mechanism round parts of the periphery of a pair of guide bars 12, 14, which serve to horizontally align the web 10 with the inlet to the diverter.

A web drive roll 18 is disposed below the web 10 at right angles to the direction of movement of the web. The roll 18 is driven through meshing gear wheels 20, 22 and 24 which are themselves driven from the main drive (not shown) to the printing machine. The web 10 is pressed into contact with the roll by means of a plurality of gravity-loaded wheels 26 mounted upon a supporting rod 16.

Five slitter blades 28 are adjustably mounted upon, but locked to, a support shaft 30 therefor. The shaft 30 is driven through meshing gear wheels 32, 34, 36 from a gear wheel 33 fast to the drive for the drive roll 18. Thus, as the slitter blades 28 rotate, the paper web 10 is severed into four cut lengths 40 each of equal width. The two outer blades 28 sever marginal portions 42 from the web and these are led away to waste through a suction pipe 44.

A diverting and aligning mechanism in accordance with the invention is removably mounted in the main printing machine frame and is disposed immediately downstream of the slitter blades.

The diverter serves to both divert the cut lengths 40 from travelling in side-by-side relationship to travelling in superimposed relationship in a stack generally shown as 45 and to bring the printed matter on the separate lengths in the stack into register.

The diverter mechanism includes a frame assembly 48 the upper part of which, as viewed, consists of a rectangular tubular framework which fixedly mounts a plurality of diverting bars or rollers 50 mounted with their axes substantially diagonally to the path of movement of the cut lengths 40. The bars 50 are mounted on tubular limbs of the upper framework by flanges 52. It will be seen that a diagonal bar 50 is provided for each cut length 40, and the length 40 is wrapped around part of the periphery of the diagonal bar and led away to the right, as viewed, in the direction of the arrows.

It will be appreciated that any printed matter upon the cut lengths 40 which was in horizontal alignment prior to the lengths passing around the divert bars, is now out of alignment because of the spacing between the diagonal bars 40. An alignment section shown generally as 46 is therefore provided to bring the printed matter which was in side-by-side relation upon the lengths 40 into register in the stack 45. The alignment section includes two vertically spaced rollers 54 and 56 for each cut length 40 and it will be seen that the left hand cut length, as viewed, passes around the left hand rollers 54 and 56 to form the top leaf in the stack 45.

Similarly the right hand cut length 40 passes

round the right hand rollers 54 and 56 to form the bottom of the stack. The section between adjacent pairs of rollers 54 and 56 is such as to correct the mis-alignment between the printed matter which has been operated by the diverter bars 50. Thus, the printed matter in the stack of paper 45 is in vertical register in the required manner.

The whole of the alignment section is supported from a lower framework 58 which is itself supported from the upper framework by a pair of support members 60, one of which may be seen in the drawing.

Means are provided for laterally displacing the frame assembly 48. This means is shown diagrammatically in the drawing at the left side thereof. A body portion 63 is fixedly secured as for example by welding to the frame of the printing machine frame. A threaded spindle 66 which is rotatable by a handwheel 68a passes through a bore in the body 63 and through a similar internally threaded bore in a cylinder which mounts a bifurcated strut 62. A pin 68 on the diverter frame assembly is received between the fork of the strut 62. It will thus be seen that as the handwheel 68a is rotated, the diverter frame assembly is caused to be moved to the left or right, as viewed, or vice versa in dependence of the direction of rotation of the handwheel 68. The movement of strut 62 is guided by a guide portion 64 of the body 63.

It will be appreciated that whilst the frame of the diverter mechanism shown includes four bars 50 for supporting four cut lengths 40, if the paper web was cut into, for example, three widths, then three diverter bars 50 would be provided together with three sets of bars or rollers 54 and 56.

When it is desired to change from one set of paper widths to another, all that the operative need do is remove the frame assembly which is at that time installed in the printing machine and replace it by a diverter having the requisite number of diagonal bars and alignment rollers.

The invention is not restricted to the case where the diverter bars 50 are arranged diagonally with respect to the direction of feed of the web, since it will be apparent that the cut lengths 40 may be diverted to any desired position in dependence upon the inclination of the bars 50 with respect to the direction of the travelling web.

Finally, it will be appreciated that in addition to a diverter mechanism comprising divert bars or rollers and alignment bars or rollers, the invention also provides a printing machine wherever provided with a diverter mechanism in accordance with the invention.

#### WHAT WE CLAIM IS:—

1. A removably mountable diverting and aligning mechanism for diverting a plurality of webs travelling in a first direction in side-by-side relationship for movement, in register, and in superimposed relationship in a second direction, said mechanism comprising a frame assembly mounting a plurality of rollers or bars

- over which respectively ones of said webs are caused to pass, said rollers or bars having longitudinal axes so aligned at an angle with respect to said frame assembly that webs
- 5 leaving the rollers or bars do so in the plane of said second direction, and a pair of alignment rollers or bars associated with each said first-mentioned roller or bar, said alignment rollers or bars being carried by said frame assembly,
- 10 each pair of alignment rollers or bars being operable to correct misalignment in the webs introduced by said first-mentioned rollers or bars.
2. A mechanism as claimed in claim 1 in
- 15 which the first-mentioned rollers or bars are mounted with their longitudinal axes aligned diagonally on said frame assembly with respect to said first direction.
3. A mechanism as claimed in claim 1 or 2
- 20 in which the first-mentioned rollers or bars are carried in a first frame of said frame assembly and in which the alignment rollers or bars are carried in a second frame of said assembly disposed beneath said first frame.
- 25 4. A mechanism as claimed in claim 1, 2 or 3 in which the spacing between both the first-mentioned rollers or bars and the alignment

rollers or bars is fixed and set to accommodate a fixed width of paper or the like.

5. A mechanism as claimed in any one of claims 1 to 4 in which means are provided for adjustably mounting said mechanism in a printing machine. 30

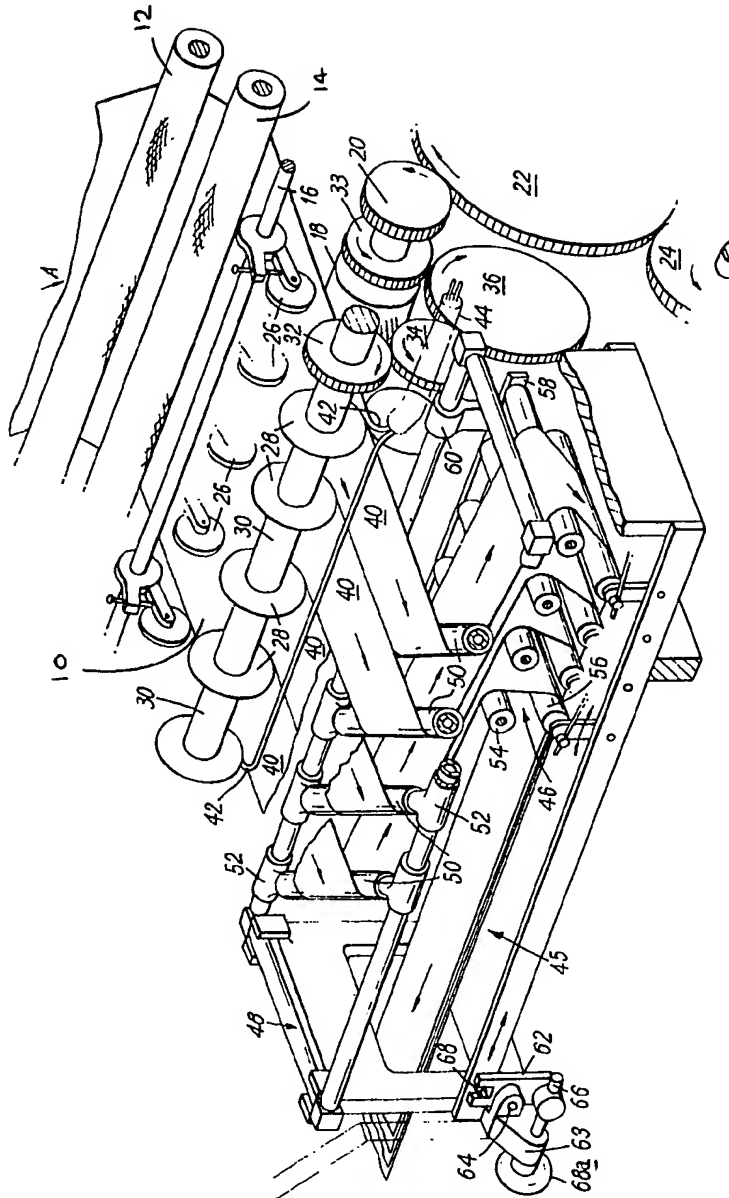
6. A mechanism as claimed in claim 5 in which said means enables the frame assembly to be displaced laterally with respect to said first direction. 35

7. A printing machine whenever embodying a removably mounted diverting and aligning mechanism as claimed in claim 1. 40

8. A removably mountable diverting and aligning mechanism for diverting a plurality of webs travelling in a first direction in side-by-side relationship for movement, in register and in superimposed relationship, in a second direction substantially as herein described with reference to and as illustrated in the accompanying drawing. 45

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